Science Literacy Level of Global Warming Issue to Sustainable Lifestyles of Elementary School Teachers

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Abstract: This research aimed to identify the scientific literacy level of global warming and its correlation to the sustainable lifestyles of the teachers of elementary school, including how they implement it. The research goal was conducted since global warming phenomena affect the balance of ecology and human life. For this reason, mitigation in the education sector is needed. Disaster mitigation in terms of education refers to the policies of the Ministry of Education and Culture. The policy document includes the application of scientific literacy in learning to prepare people for global warming. Besides, the policy document aims to foster a sustainable lifestyle as an effort to overcome the increasing ecological footprint that exceeds the existing space capacity. Therefore, this must be instilled in children's learning from an early age. Learning an old age put the teachers with a critical role so that we put the teachers as the primary sample research. The research data was processed using quantitative and qualitative descriptive data analysis techniques. The result shows 77% of teachers have moderate science literacy level of the global warming, then for sustainable lifestyles, there are about 77% of teachers in the "good" category and 23% of teachers in the moderate group. For the implementation, the teacher still uses the lecture method with the LKS handbook.

1 INTRODUCTION

As an ecological imbalance, Global warming is a process of increasing the average temperature of the Earth's atmosphere. This phenomenon caused by increasing greenhouse gases that now being an international consensus among scientists (Juhadi et al., 2013 Smith et al., 2019). These greenhouse gases make sunlight cannot be reflected out of space optimally so that it accumulates in Earth and make the surface temperature increase (Wuryandari, 2016). The increasing temperature is calculated at 0.8 °C on the global mean surface temperature (GMST) since the beginning of the industrial era based on the special report of the Intergovernmental Panel on Climate Change (IPCC) in 2019 (IPCC, 2019). To-third of the temperature increased began in 1975. So that scientists limit the "safe" temperature of the Earth's surface at 1.5 °C.

Human activities that trigger an increase in greenhouse gases are the excessive use of fossil fuels. Those activities are related to the utilizing of motor vehicles, industrial activities, deforestation, air conditioners usage. The accumulation of carbon compounds in the atmosphere potentially gives damage to the ozone layer and other adverse effects (Meiviana, 2004) as had been recorded in 2015, 18.35 billion tons of carbon dioxide released on the Earth's atmosphere (Sulistyo, 2015). By the rapid development and carbon-emitting, the amount of carbon dioxide in the atmosphere must increase by the present time. As had been recorded, the increasing number of motor vehicles in Indonesia, from 2015 to 2017, was around 121 million, 129 million, 138 million, respectively (BPS, 2018).

The increasing number of motor vehicles will cause an increase in CO2 in the atmosphere. Where CO2 is one of the constituents of greenhouse gases, it will trigger more greenhouse gases that accumulate in the atmosphere and cause more heat from the sun retained on Earth. This condition will threaten the life of living things on Earth, including humans (Anenberg et al., 2012; Hansen et al., 2013; Hao et al., 2016). If this phenomenon is allowed to continue, it will have an impact on the ecological balance. To overcome this, the Ministry of Education and Culture (Kemendikbud) in 2017 urges the public to master scientific literacy.

Science literacy defines as an ability to understand, communicate, and use science to solve

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problems and bear the attitude of sensitivity for their own and their environment (Arif, 2017).By science literacy, the community is expected able to have the skills to use their scientific knowledge in making wise attitudes toward the environment.

This attitude and high sensitivity towards the environment is also called sustainable lifestyle. A sustainable lifestyle is a concept adapted from the concept of sustainable development, which states that development or improvement of people's welfare in meeting needs without ignoring future needs. A sustainable lifestyle is more directed to a personal lifestyle that can be done by individuals in their daily activities related to environmental preservation so that the environment has a sustainable function for the next generation (Saraswati, 2012). Sustainable lifestyles are possibly associated with small things that we do every day and can have an impact on the environment.

The concept of global warming and sustainable lifestyle scientific literacy must be instilled from an early age. At this early age, children tend to imitate the things around them quickly, as the nature of early childhood characteristics (Kartadinata, 2003).

Therefore, the teacher's role is crucial in early childhood learning because the teacher will later become a role model for their students (Rosidin and Suyatna, 2017). Teachers are also expected to have a good understanding of global warming literacy and sustainable lifestyle literacy so that they can be modeled and can achieve successful learning. From the above, the writer will examine how the level of scientific literacy of "global warming" of the sustainable lifestyles of elementary school teachers.

2 METHOD

This research was conducted in Bangsri Village, Bangsri District, Jepara Regency, Central Java, in June 2019. The population of the research area was 76 teachers. From this population, the number of samples taken by purposive sampling, as a sampling technique with specific considerations, namely the teachers who take care of the grade classes of 4, 5, and 6 because they began to teach global warming in particular subjects. Based on the criteria of the research, the samples are collected up to 30 teachers.

3 STUDY AREA

The research was conducted in Bangsri Village as one of the villages in Bangsri District, Jepara Regency. Bangsri Village is located at 6 ° 31 '59 "- 6 ° 32 '15" South Latitude and 110 ° 44 '22 "110 ° 46 '0" East Longitude. Bangsri Village is in an area with a height of <500 m above sea level, so it can be categorized that Bangsri Village has a gentle topography. Bangsri Village has an area of 748.78 Ha or equal to 7.49 km2, partly dominated by forests in 45% and buildings in 37% and other as mix land uses. Rainfall in Bangsri District itself is around 1127 mm/year, with 98 rainy days.

The population in the Bangsri Village is around 17,998. The population density of Bangsri village is around 2,403 per km2. In addition, the sex ratio of Bangsri Village is 99 from 8,932 for the male population, and 9,066 for the female population. So there are every 100 women there is 99 male population.

Bangsri Village has eight public elementary schools with a total of 98 classrooms. Besides, in the village of Bangsri, there are also two private primary schools with a total of about 14 classrooms with a total of 235 students and 17 teachers.

4 RESULT AND DISCUSSION

4.1 Science Literacy Level of Global Warming

Based on the analysis of primary data from the questionnaires, 77% of teachers have scientific literacy of global warming at a moderate level, then 13% of teachers have scientific literacy of global warming at a low level, and 10% of teachers have scientific literacy of global warming at a high level.

From the percentages can be described that the average teacher of this research sample has a moderate science literacy level of the global warming. To teach a subject matter, the teachers must have good knowledge so that there are no misconceptions when teaching students, this statement in line with Dal et al. (2015); Abidin, Mulyati, and Yunansah (2017); Rosidin and Suyatna, 2017; Dal et al. (2019). The theory stated that teachers must be able to become effective teachers in terms of personal quality, knowledge, reproduction skills of practice, and problem-solving.

From the results of primary data analysis, it is also known that several trends can be seen from the

background of the teacher being studied. Because the teachers have backgrounds such as employment status, age, and different teaching classes. The results of the primary data analysis stated that the teachers who teach in grade 6 tend that their global warming literacy is at a moderate-high level.

Then for teachers who teach in class 5 tend to have the level of global warming scientific literacy at a moderate level, and for teachers who teach in grade 4 tend to have the level of global warming scientific literacy at a low-moderate level.

This can be caused by the teacher placement factor at a grade level also influenced by the level of knowledge they have (Rosidin and Suyatna, 2017; Dal et al., 2019).

Then for employment status does not affect how the level of scientific literacy of the global warming possessed by teachers because based on the results of primary data analysis of 13% of teachers who have low scientific literacy level of the global warming comes from teachers who have certification of the employment status and for 10% of teachers those who have high scientific literacy level of the global warming are also teachers who have certified of the employment status and for 77% of teachers who have global warming literacy which is comprised of teachers who have both certification and non-certification employment status.

So it cannot be said that teachers who have certified with scientific literacy status are all high or low as well as teachers who do not have certification. This condition is in line with Abidin, Mulyati, and Yunansah (2017) that the real development of teachers lies in the willingness and ability to develop themselves when they have become teachers.

As seen in Figure 1 there are six parameters for two indicators, namely knowledge indicators consisting of 3 settings, namely content, procedural, and episystemic knowledge. episystemic is the term to understand the role of defining the critical features and specific constructions. This term also identifies as the process of building knowledge in science (Abidin et al., 2017). For the second indicator as the competency indicator also includes 3 parameters, namely the parameters for science usage in explaining global warming, preparation of scientific experiments, and interpretation of data and facts.

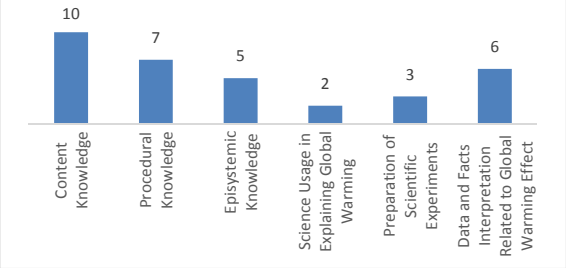

Figure 1: Graph of comparison of parameters in global warming science literacy. Source: primary data analysis, 2019.

In Figure 1, the indicator of episystemic knowledge has a low value compared to other parameters in terms of knowledge parameters. It seems ironic considering that episystemic knowledge is an essential term in global warming. As for the indicators of competency, the science usage in explaining global warming has the lowest value, among other competency parameters.

The two low parameters indicate that the teachers have not mastered the global warming scientific literacy yet. So that when teaching global warming, the teachers will face the difficulties of using scientific terms.

In addition to these two parameters, the skill parameters compiling scientific experiments also get the lowest value after the parameters of the use of science in explaining global warming. Because based on the results of observation also showed that the sample was never taught using simple scientific experiment methods in the classroom. So when answering questions for this parameter, the teachers are having difficulty getting the conclusions.

When compared between the two indicators, the knowledge indicator has a higher average value than the competency indicators. Based on the results of the primary data analysis, the overall teachers have a higher knowledge value than competency or skill.

4.2 Sustainable Lifestyles Attitude

The sustainable lifestyle attitude will be grouped into three categories: good, moderate, and not good. And based on the results of primary data processing, there are 77% of the teachers have good sustainable lifestyles, and 23% of teachers are categorized into moderate category. Besides, there are about 76% of teachers who have been certified. With this certification program, teachers receive a one-time salary allowance so that it can be used to improve economic conditions. By having a good financial situation, it will also affect individual consumption. Sustainable lifestyles have the following indicators:

Table 1: Percentage of Each Category on Sustainable Lifestyles Indicator (Source: Primary data analysis, 2019).

Sustainable lifestyles Indicators	Category		
	Not Good	Moderate	Good
Intensity of Motorbike Use	20%	63%	17%
Energy Saving Behavior	17%	53%	30%
Paper Use	7%	70%	23%
Tissue Use	13%	70%	17%
Meat Consumption Intensity	13%	63%	24%
Tree planting	10%	73%	17%
Plastics Use	10%	70%	20%
AC Use	6%	67%	27%

Based on Table 1, the highest percentage of "not good" attitude is the usage of motorbike. From the analysis of the statement items on the questionnaire, it is known that there is around 53% of the sample traveling for both short and long distances

Furthermore, 73% of the sample answered that they are always using a motorbike when leaving for work.

Figure 2:Teacher's motorbike parking.

The use of motorbikes for working can also be affected by the distance between the house to school. Based on the questionnaire, the distance can be categorized into three groups; ≤ 500 m (23%), 600-1 km (27%), and 1.5 km (50%). So, the use of motorbikes becomes essential to improve mobility.

However, the use of the motorbikes cannot easily be stopped since Indonesia is located at the latitude of the equator geographically, which has a tropical climate so that the air tends to be hot so that the majority of people become dependent on motorized vehicles. But we can be wise in using a motorbike, for example, when the intended distance is close, we can use a bicycle or even walking. Besides, the government has also provided public transportation to become a choice.

The next indicator is life-saving behaviour. Around 53% of the teachers were categorized to have a good energy-saving behaviour. As had been shown in the analysis of the questionnaire. For examples, the teachers have aware to turn off electronic equipment including the unoccupied room when they are not being used. As shown by picture below that the classroom lights and the teacher's room are turned off during the daytime and equipment such as televisions and fans also turned off when not in use.

Figure 3: Teacher's room condition.

The third indicator is the use of paper; 50 % of the teachers sometimes uses scrap paper to give assignments. One of them is making a craft from paper recycling, as shown in Figure 4.

Figure 4: Craft from paper.

The fourth indicator is the use of tissue. An average of 70% of teachers has relatively good use of tissue. Even though 66% of the samples answered that sometimes they bring a tissue to school, but the teachers did not show it to students, as shown in the picture below, which did not show the use of tissue on the teacher's desk.

Figure 5: Teacher's table condition.

Furthermore, for the indicator of meat consumption, some samples have non-consumptive lifestyles. It is also proven that 46% of the teachers do not often consume meat in a week. In this case, the teachers' lifestyles are already healthful because even though 76% of the teachers already have certification status and include civil servants (PNS), that means having a higher income level.

To plant a tree, 40% of the teachers often plant trees at home, and 50% of the sample answered sometimes. The teachers always choose because it is influenced by land and area factors, other than that to plant trees cannot be done every day. Then to plant trees to train students, there is 70% of the sample answered often. Even so, there are some schools whose parks are poorly maintained, as shown below.

Figure 6: Garden in school.

The next indicator is the use of plastic, 63% of the sample that sometimes brings lunch to school because as it is known that schools provide tea or water in the glass provided in the glass as shown in Figure 5, but in the items replacing plastic with shopping bags, 66% of the sample Never carry shopping bags when shopping. The conclusion, on average, about 70% of the sample stated a quite good attitude for plastic usage.

Figure 7: Optimizing of using glass for drinking water.

The last indicator is the use of air conditioner (AC) 80% of the sample does not use AC at home, 20% of the teachers often answered and sometimes used AC at home, this indicates that there are about 20% of samples that have AC at home. As figured out from the status of employmentwho have been certified, there are around 76% of the teachers that are considered capable of buying air conditioners related to their employment status. However, in reality, only 20% of samples have air conditioners at home. This phenomenon shows a proper attitude of using air conditioners.

5 CONCLUSIONS

The level of scientific literacy of the global warming of elementary school teachers by 77% is still considering in the moderate category. On the other hand, the tremendous knowledge is needed to teach students and avoiding misconceptions, linearly with the theory that the quality of the teacher's explanation and expertise will affect the success of student learning (Hiller in Laksana, 2015). Of the 77% of global warming scientific literacy results, the teacher is more knowledgeable about global warming than the practice of applying that knowledge into a scientific experiment or data interpretation because based on the results of the interview also note that the teacher does not use scientific experiments at all in teaching class.

With a moderate level of global warming scientific literacy, teachers have a "good" sustainable lifestyle attitude of 77%. The economic level of the teachers influences the lifestyle attitude, including their needs. There are about 76% of the sample who have certification of the civil servant employment status are considered having good financial conditions and can meet the consumption needs of tertiary and energy consumption for sophisticated electronic equipment. Still, even so, these eight indicators for sustainable lifestyles show proper behaviour.

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